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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Kulkarni, et al.

Attorney Docket No.: CISC271/5126

Application No.: 10/084,698

Examiner: Salad, Abdullahi Elmi

Filed: 02-27-2002

Group: 2157

Title: METHODS AND APPARATUS FOR
MOBILE IP HOME AGENT CLUSTERING

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Mary Deauclaire

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(37 CFR 192)**

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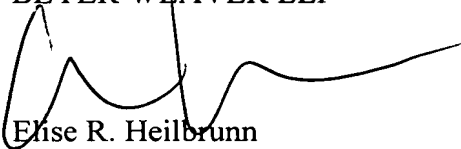
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Respectfully submitted,
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THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex Parte KULKARNI et al.

Application for Patent: 10/084,698

Filed: February 27, 2002

Group Art Unit 2157

Examiner Salad, Abdullahi Elmi

For:

METHODS AND APPARATUS FOR MOBILE IP HOME AGENT CLUSTERING

APPEAL BRIEF

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1. REAL PARTY IN INTEREST

[37 CFR 41.37(c)(1)(i)]

The real party in interest is Cisco Technology, Inc.

2. RELATED APPEALS AND INTERFERENCES

[37 CFR 41.37(c)(1)(ii)]

There are no related appeals or interferences.

3. STATUS OF CLAIMS

[37 CFR 41.37(c)(1)(iii)]

The following claims have been rejected and appealed: claims 1-28, 44-46 and 50-76.

The claims on appeal are reproduced below in the Appendix at Section 9 of this Appeal Brief.

4. STATUS OF AMENDMENTS

[37 CFR 41.37(c)(1)(iv)]

No amendments were filed subsequent to final rejection. All amendments previously filed have been entered.

5. SUMMARY OF CLAIMED SUBJECT MATTER

[37 CFR 41.37(c)(1)(v)]

5.1. Independent Claims 1 and 44-46

Claim 1 recites:

In a first one of a plurality of Home Agents supporting Mobile IP, a method of processing a registration request from a Mobile Node that has roamed to a Foreign Agent supporting Mobile IP, comprising:

- receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents;

- sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent;

- creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent;

- receiving a registration reply from the second one of the plurality of Home Agents;

- updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents; and

- sending the registration reply to the Foreign Agent identified in the temporary binding.

The disclosed embodiments include a main (i.e., primary) Home Agent that serves as a Home Agent cluster controller for a cluster of Home Agents including one or more Home Agents. As shown in FIG. 2, the main Home Agent 202 and the cluster of Home Agents 204, 206, 208 can be configured with a virtual IP address that can also be configured on the Mobile Node 210. See, e.g. page 11, lines 8-24; FIG. 2; See e.g., page 13, lines 1-20 for details on configuration of the Mobile Node and the Home Agents. Alternatively, the Foreign Agent may be configured with the virtual IP address. See e.g., page 14, lines 2-10. When the Mobile Node 210 roams to a

Foreign Agent 212, the Foreign Agent 212 forwards the registration request to the primary Home Agent 202. The registration request can specify the virtual IP address in the Home Agent field of the registration request. See e.g., page 14, lines 2-10.

The first limitation recites “receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents.” When the primary Home Agent receives the registration request addressed to the virtual Home Agent address, it determines which Home Agent in the cluster of Home Agents should receive and process the registration request. See e.g., page 15, lines 4-18.

The second limitation recites “sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent.” More particularly, the primary Home Agent identifies the Home Agent for the Mobile Node (if one exists) or selects one of the Home Agents in the cluster prior to sending the registration request to that Home Agent. See e.g., page 15, lines 4-18. When the “clustered” Home Agent receives the registration request, it processes the registration request and creates a binding between the Mobile Node and the Foreign Agent. See e.g., page 16, lines 3-5.

The third limitation recites “creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent.” See e.g., page 15, lines 19-25. The temporary binding enables the primary Home Agent to identify the Foreign Agent, which is to receive the registration reply once it is received from the responsible “clustered” Home Agent. In addition, the temporary binding may also identify the Home Agent that is to receive and process the registration request. More specifically, if a registration request is pending and a registration reply has not yet been received, the binding will be temporary rather than

permanent. See e.g., page 12, lines 14-16. During this period of time, the temporary binding may be used to ensure that incoming data traffic is sent to the appropriate Home Agent. See page 12, lines 16-18.

The fourth limitation recites “receiving a registration reply from the second one of the plurality of Home Agents.” The clustered Home Agent processes the registration request and sends a registration reply to the primary Home Agent, which serves as a cluster controller. See e.g., page 16, lines 8-11.

The fifth limitation recites “updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents.” See e.g., page 16, lines 15-21. The primary Home Agent updates the temporary binding to create a permanent binding when it receives the registration reply from the clustered Home Agent. For instance, the permanent binding may include information from the temporary binding, as well as additional information, such as a registration lifetime that may be obtained from the registration reply previously received from the clustered Home Agent.

The sixth limitation recites “sending the registration reply to the Foreign Agent identified in the temporary binding.” The primary Home Agent then sends the registration reply to the Foreign Agent. See e.g., page 16, lines 22-23. The cluster controller may look up the temporary binding to identify the Foreign Agent prior to sending the registration reply to the Foreign Agent. See e.g., page 16, lines 16-17.

Claims 44-46 recite substantially the same limitations.

5.2. Dependent Claims 2-28, 50-76

Claim 2 recites “wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.” See e.g., page 15, line 24 – page 16, line 2.

Claim 3 recites “wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address associated with the second one of the plurality of Home Agents, and a registration lifetime.” The permanent binding may include information from the temporary binding, as well as a registration lifetime. See original claim; see e.g., page 16, lines 18-21.

Claim 4 depends from claim 3, and further recites “wherein the identifier is an IP address.” See e.g., page 17, lines 10-13. A temporary binding includes a Mobile Node identifier such as an IP address. The permanent binding may include information from the temporary binding. See e.g., page 16, lines 18-20.

Claim 5 depends from claim 4, and further recites “wherein the permanent binding further comprises an NAI associated with the Mobile Node.” A temporary binding may include a NAI instead of, or in addition to, the IP address. See e.g., page 17, lines 18-20. The permanent binding may include information from the temporary

binding. See e.g., page 16, lines 18-20. Therefore, the permanent binding may include an NAI associated with the Mobile Node.

Claim 6 depends from claim 3, and further recites, “obtaining the registration lifetime from the registration reply received from the second one of the plurality of Home Agents.” See e.g., original claim; see e.g., page 12, lines 20-23.

Claim 7 depends from claim 1, and further recites “wherein updating the temporary binding to create a permanent binding comprises: specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.” See e.g., original claim; see e.g., page 12, lines 20-23; see e.g., page 16, lines 18-21.

Claim 8 depends from claim 7 and further recites “claim 7, wherein updating the temporary binding to create a permanent binding comprises: specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.” See e.g., original claim; see e.g., page 12, lines 20-23; see e.g., page 16, lines 18-21. More particularly, the permanent binding may include the IP address from the temporary binding. See e.g., page 15, line 24-page 16, line 2; see e.g., page 16, lines 15-21; see original claim.

Claim 9 depends from claim 1, and further recites “obtaining the temporary binding and identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent.” See e.g., page 12, lines 8-10; see e.g., original claim.

Claim 10 depends from claim 1, and further recites “wherein the registration request specifies a destination MAC address equal to a MAC address assigned to the second one of the plurality of Home Agents.” The registration request specifies a destination MAC address as a MAC address assigned to the clustered Home Agent. See e.g., page 16, lines 5-6. In other words, the registration request is sent to the clustered Home Agent.

Claim 11 depends from claim 1, and further recites “wherein the registration reply specifies a destination MAC address equal to a MAC address assigned to the first one of the plurality of Home Agents.” The registration reply specifies a destination MAC address as a MAC address assigned to the primary Home Agent. See e.g., page 16, lines 11-14. In other words, the primary Home Agent receives the registration reply transmitted by the clustered Home Agent.

Claim 12 depends from claim 1, and further recites “wherein the registration request specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 5-8. In other words, the registration request does not identify a particular Home Agent, but rather identifies a virtual Home Agent address assigned to the cluster of Home Agents including the primary Home Agent.

Claim 13 depends from claim 1, and further recites “wherein the registration reply specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 11-14. In other words, the registration reply does not identify a

particular Home Agent, but rather identifies a virtual Home Agent address assigned to the cluster of Home Agents including the primary Home Agent.

Claim 14 depends from claim 1, and further recites “wherein the registration request specifies a destination IP address as the virtual Home Agent address and the registration reply specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 5-8, lines 11-14. In other words, both the registration request and registration reply do not identify a particular Home Agent, but rather identify a virtual Home Agent address assigned to the cluster of Home Agents including the primary Home Agent.

Claim 15 depends from claim 1, and further recites “advertising a virtual network associated with the virtual Home Agent address.” See e.g., page 13, lines 12-15. The primary Home Agent advertises the virtual network associated with the virtual Home Agent address.

Claim 16 depends from claim 15, and further recites “wherein advertising comprises sending a routing table update.” See e.g., page 13, lines 12-15. Advertisements transmitted by the primary Home Agent may include routing table updates.

Claim 17 depends from claim 1, and further recites “sending at least one of Home Agent health and load information associated with the first one of the plurality of Home Agents to one or more of the plurality of Home Agents.” See e.g., page 13, lines 15-19; see original claim. The primary Home Agent may send its own health and load information to one or more Home Agents in the Home Agent cluster.

Claim 18 depends from claim 15, and further comprises “receiving an advertisement from one of the plurality of Home Agents, the advertisement advertising the virtual network associated with the virtual Home Agent address.” See original claim; see page 13, lines 12-19. Similarly, the primary Home Agent may receive an advertisement from one of the Home Agents in the cluster, where the advertisement advertises the virtual network associated with the virtual Home Agent address.

Claim 19 depends from claim 18, “wherein receiving an advertisement from one of the plurality of Home Agents comprises: receiving one or more routing table updates advertising the virtual network associated with the virtual Home Agent address.” See original claim; see page 13, lines 12-19. Advertisements transmitted by Home Agents in the cluster and received by the primary Home Agent may include one or more routing table updates.

Claim 20 depends from claim 18, and further comprises: “receiving at least one of Home Agent health and load information associated with the one of the plurality of Home Agents.” See original claim; see page 13, lines 12-19. The

primary Home Agent receives at least one of Home Agent health and load information associated with the Home Agent from which the advertisement was received (see claim 18).

Claim 21 depends from claim 1, and further comprises “receiving at least one of Home Agent health and load information associated with one of the plurality of Home Agents.” See original claim; see page 13, lines 12-19; see page 20, lines 5-10. The primary Home Agent receives at least one of Home Agent health and load information associated with one of the clustered Home Agents.

Claim 22 depends from claim 21, and further comprises:

“determining from the Home Agent health information whether the one of the plurality of Home Agents is functioning; and

when the one of the plurality of Home Agents is not functioning, sending a set of Mobile Node bindings to a backup Home Agent associated with the virtual Home Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent.” See page 20, line 15 – page 21, line 1. The primary Home Agent determines from Home Agent health information whether the Home Agent from which the Home Agent health information was received is functioning. If the Home Agent is not functioning, a set of Mobile Node bindings are sent to a backup Home Agent associated with the virtual Home Agent address, and one or more bindings maintained by the primary Home Agent are also updated such

that the bindings are associated with the backup Home Agent (rather than the non-functional Home Agent).

Claim 23 depends from claim 22, “wherein updating one or more bindings such that the one or more bindings are associated with the backup Home Agent comprises associating one or more Mobile Nodes with an IP address of the backup Home Agent.” See page 20, lines 21-22. The updating of bindings may include associating one or more Mobile Nodes with an IP address of the backup Home Agent.

Claim 24 depends from claim 22, and further comprises “selecting the backup Home Agent from a plurality of backup Home Agents.” See original claim; see page 21, lines 2-3. The primary Home Agent may select the backup Home Agent from a plurality of backup Home Agents.

Claim 25 depends from claim 24, further comprising “examining load information of the plurality of backup Home Agents prior to selecting the backup Home Agent.” See original claim; see page 21, lines 2-6. The backup Home Agent may be selected by the primary Home Agent based upon load information of the backup Home Agents.

Claim 26 depends from claim 1, further comprising: “sending one or more bindings to one or more backup Home Agents, the one or more bindings being

associated with one or more of the plurality of Home Agents.” See page 20, lines 17-18; see original claim; see page 20, lines 22- page 21, line 1. The primary Home Agent (i.e., Home Agent Cluster Controller) can send bindings associated with Home Agents in the Home Agent cluster to one or more backup Home Agents, enabling one of the backup Home Agents to take over for a failed Home Agent in the cluster.

Claim 27 depends from claim 26, wherein sending one or more bindings comprises “sending one or more temporary bindings and one or more permanent bindings to the one or more backup Home Agents.” See e.g., page 8, lines 8-11. The primary Home Agent may send temporary and/or permanent bindings to the backup Home Agents.

Claim 28 depends from claim 1, and further comprises:

“when the registration request is received, searching for a binding for the Mobile Node;

when a binding for the Mobile Node exists, identifying the second one of the plurality of Home Agents in the binding prior to sending the registration request to the second one of the plurality of Home Agents; and

when a binding for the Mobile Node does not exist, selecting the second one of the plurality of Home Agents prior to sending the registration request to the second one of the plurality of Home Agents.”

The primary Home agent searches for a binding for the Mobile Node. If a binding already exists, the registration request is sent to that Home agent; otherwise, a

second Home agent is selected. See e.g., page 11, line 20 – page 12, line 19; see original claim.

Claim 50 depends from claim 45, “wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.” See e.g., page 15, line 24 – page 16, line 2.

Claim 51 depends from claim 45, “wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address associated with the second one of the plurality of Home Agents, and a registration lifetime.” The permanent binding may include information from the temporary binding, as well as a registration lifetime. See original claim; see e.g., page 16, lines 18-21.

52 depends from claim 51, “wherein the identifier is an IP address.” See e.g., page 17, lines 10-13. A temporary binding includes a Mobile Node identifier such as an IP address. The permanent binding may include information from the temporary binding. See e.g., page 16, lines 18-20.

Claim 53 depends from claim 52, “wherein the permanent binding further comprises an NAI associated with the Mobile Node.” A temporary binding may

include a NAI instead of, or in addition to, the IP address. See e.g., page 17, lines 18-20. The permanent binding may include information from the temporary binding. See e.g., page 16, lines 18-20. Therefore, the permanent binding may include an NAI associated with the Mobile Node.

Claim 54 depends from claim 51, “at least one of the processor and the memory being further adapted for obtaining the registration lifetime from the registration reply received from the second one of the plurality of Home Agents.” See e.g., original claim; see e.g., page 12, lines 20-23. The primary Home Agent may obtain the registration lifetime from the registration reply that was transmitted by the clustered Home Agent.

Claim 55 depends from claim 45, “wherein updating the temporary binding to create a permanent binding comprises specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.” See e.g., original claim; see e.g., page 12, lines 20-23; see e.g., page 16, lines 18-21. The primary Home Agent may update a temporary binding to a permanent binding by specifying a granted registration lifetime. It is important to note that the registration lifetime is obtained from a registration reply that has been received from the clustered Home Agent.

Claim 56 depends from claim 55, “wherein updating the temporary binding to create a permanent binding comprises specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.” More particularly, the

permanent binding may include specifying an IP address that has been assigned to the Mobile Node by the clustered Home Agent. See e.g., page 15, line 24-page 16, line 2; see e.g., page 16, lines 15-21; see original claim.

Claim 57 depends from claim 45, at least one of the processor and the memory being further adapted for:

obtaining the temporary binding; and

identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent. See e.g., page 12, lines 8-10; see e.g., original claim. The primary Home Agent may identify the Foreign Agent from the temporary binding in order to forward the registration reply received from the clustered Home Agent to the Foreign Agent.

Claim 58 depends from claim 45, “wherein the registration request specifies a destination MAC address equal to a MAC address assigned to the second one of the plurality of Home Agents.” The registration request specifies a destination MAC address as a MAC address assigned to the clustered Home Agent. See e.g., page 16, lines 5-6. In other words the registration request is sent to the clustered Home Agent by the primary Home Agent.

Claim 59 depends from claim 45, “wherein the registration reply specifies a destination MAC address equal to a MAC address assigned to the first one of the plurality of Home Agents.” The registration reply specifies a destination MAC address as a MAC address assigned to the primary Home Agent. See e.g., page 16,

lines 11-14. In other words, the registration reply is sent by the clustered Home Agent to the primary Home Agent.

Claim 60 depends from claim 45, “wherein the registration request specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 5-8. The registration request is not sent to a specific Home Agent, but rather, it is sent to a virtual Home Agent address.

Claim 61 depends from claim 45, “wherein the registration reply specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 11-14. Similarly, the registration reply is not sent to a specific Home Agent, but rather, it is sent to a virtual Home Agent address.

Claim 62 depends from claim 45, “wherein the registration request specifies a destination IP address as the virtual Home Agent address and the registration reply specifies a destination IP address as the virtual Home Agent address.” See e.g., page 16, lines 5-8, lines 11-14. Both registration request and reply packets are sent to the virtual Home Agent address.

Claim 63 depends from claim 45, “at least one of the processor and the memory being further adapted for:

advertising a virtual network associated with the virtual Home Agent address.” See e.g., page 13, lines 12-15. The primary Home Agent advertises a virtual network associated with the virtual Home Agent address.

Claim 64 depends from claim 63, “wherein advertising comprises sending a routing table update.” See e.g., page 13, lines 12-15. Advertisements may be accomplished by sending a routing table update.

Claim 65 depends from claim 45, “at least one of the processor and the memory being further adapted for:

sending at least one of Home Agent health and load information associated with the first one of the plurality of Home Agents to one or more of the plurality of Home Agents.” See e.g., page 13, lines 15-19; see original claim. The primary Home Agent may send its own health and load information to one or more of the clustered Home Agents, enabling the primary Home Agent to be replaced should the primary Home Agent become non-functional.

Claim 66 depends from claim 63, “at least one of the processor and the memory being further adapted for:

receiving an advertisement from one of the plurality of Home Agents, the advertisement advertising the virtual network associated with the virtual Home Agent address.” See original claim; see page 13, lines 12-19. The primary Home Agent

receives an advertisement from one of the clustered Home Agents, where the advertisement advertises the virtual network associated with the virtual Home Agent address.

Claim 67 depends from claim 66, “wherein receiving an advertisement from one of the plurality of Home Agents comprises:

receiving one or more routing table updates advertising the virtual network associated with the virtual Home Agent address.” See original claim; see page 13, lines 12-19. Advertisements that are received may include routing table updates.

Claim 68 depends from claim 66, “at least one of the processor and the memory being further adapted for:

receiving at least one of Home Agent health and load information associated with the one of the plurality of Home Agents.” See original claim; see page 13, lines 12-19. The primary Home Agent receives health and/or load information associated with the clustered Home Agent from which the advertisement was received.

Claim 69 depends from claim 45, “at least one of the processor and the memory being further adapted for:

receiving at least one of Home Agent health and load information associated with one of the plurality of Home Agents.” See original claim; see page 13, lines 12-19. The primary Home Agent receives health and/or load information associated with one of the clustered Home Agents.

Claim 70 depends from claim 69, “at least one of the processor and the memory being further adapted for:

determining from the Home Agent health information whether the one of the plurality of Home Agents is functioning; and

when the one of the plurality of Home Agents is not functioning, sending a set of Mobile Node bindings to a backup Home Agent associated with the virtual Home Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent.” See page 20, line 15 – page 21, line 1.

The primary Home Agent determines from Home Agent health information whether the Home Agent associated with the Home Agent health information was received is functioning. If the Home Agent is not functioning, a set of Mobile Node bindings are sent to a backup Home Agent associated with the virtual Home Agent address, and one or more bindings maintained by the primary Home Agent are also updated such that the bindings are associated with the backup Home Agent (rather than the non-functional Home Agent).

Claim 71 depends from claim 70, “wherein updating one or more bindings such that the one or more bindings are associated with the backup Home Agent comprises:

associating one or more Mobile Nodes with an IP address of the backup Home Agent.” See page 20, lines 21-22. Updating bindings may include associating one or more Mobile Nodes with an IP address of the backup Home Agent.

Claim 72 depends from claim 70, “at least one of the processor and the memory being further adapted for:

selecting the backup Home Agent from a plurality of backup Home Agents.”

See page 21, lines 2-3. The primary Home Agent selects the backup Home Agent from a plurality of backup Home Agents.

Claim 73 depends from claim 72, “at least one of the processor and the memory being further adapted for:

examining load information of the plurality of backup Home Agents prior to selecting the backup Home Agent.” See page 21, lines 2-6. The primary Home Agent examines load information of the backup Home Agents prior to selecting the backup Home Agent.

Claim 74 depends from claim 45, “at least one of the processor and the memory being further adapted for:

sending one or more bindings to one or more backup Home Agents, the one or more bindings being associated with one or more of the plurality of Home Agents.”

See page 20, lines 17-18; see original claim; see page 20, lines 22- page 21, line 1.

The primary Home Agent (i.e., Home Agent Cluster Controller) can send bindings associated with Home Agents in the Home Agent cluster to one or more backup Home Agents, enabling one of the backup Home Agents to take over for one of the plurality of Home Agents in the event of its failure.

Claim 75 depends from claim 74, “wherein sending one or more bindings comprises:

sending one or more temporary bindings and one or more permanent bindings to the one or more backup Home Agents.” See e.g., page 8, lines 8-11. The primary Home Agent may send temporary and permanent bindings that it maintains to the backup Home Agent(s).

Claim 76 depends from claim 45, “at least one of the processor and the memory being further adapted for:

when the registration request is received, searching for a binding for the Mobile Node;

when a binding for the Mobile Node exists, identifying the second one of the plurality of Home Agents in the binding prior to sending the registration request to the second one of the plurality of Home Agents; and

when a binding for the Mobile Node does not exist, selecting the second one of the plurality of Home Agents prior to sending the registration request to the second one of the plurality of Home Agents.”

The primary Home agent searches for a binding for the Mobile Node. If a binding already exists, the registration request is sent to that Home agent; otherwise, a second Home agent is selected. See e.g., page 11, line 20 – page 12, line 19; see original claim.

6. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

[37 CFR 41.37(c)(1)(vi)]

Ground I:

Claims 1-9, 12-28 and 44-76 have been rejected under 35 USC §103 as being unpatentable over Warrier et al., U.S. Patent No. 6,707,809, ('Warrier' hereinafter) in view of Haverinen et al, U.S. Patent Application Publication No. 2001/0021175 A1, ('Haverinen' hereinafter).

Ground II:

Claims 10-11 have been rejected as being unpatentable under 35 USC §103 over Warrier and Haverinen, and further in view of Johansson, U.S. Patent Application Publication No. 2002/0080752, ('Johansson' hereinafter).

The rejected claims do not stand or fall together and each will be argued separately.

7. ARGUMENT

[37 CFR 41.37(c)(1)(vii)]

7.1. Ground I

7.1.1. Claims 1-9, 12-28, 44-46, and 50-76

Claims 1-27 and 44-76 have been rejected under 35 USC §103 as being unpatentable over Warrier et al., U.S. Patent No. 6,707,809, ('Warriar' hereinafter) in view of Johansson et al, U.S. Patent Application Publication No. 2002/0080752, ('Johansson' hereinafter).

The claimed invention enables Mobile IP Home Agent clustering to be implemented. This is accomplished through intercepting and routing registration requests and replies via a main Home Agent that acts as a Home Agent cluster controller. In this manner, Mobile IP subscribers may be supported by multiple Home Agents, rather than a single, statically configured Home Agent. This may be desirable, for example, to perform load balancing.

For example, with respect to independent claim 1, a method of processing a registration request received from a Mobile Node is performed by a first one of a plurality of Home Agents. The first Home Agent receives a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents, and sends the registration request to a second one of the plurality of Home Agents. The first Home Agent creates a temporary binding between the Mobile Node and the Foreign Agent to which the Mobile Node has roamed. The temporary binding is updated to create a permanent binding when the registration reply is received from the second Home Agent.

Warrier fails to disclose or suggest “creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent” or “updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents.” In fact, steps 56 and 60 of col. 6 and step 64 of col. 6 are performed at two different entities. In no manner does Warrier disclose or suggest creating a temporary binding that is later updated. Rather, Warrier simply discloses creating a mobility binding record at two different entities, the Home Agent Control Node and the Home Agent.

The Examiner admits that Warrier is silent regarding “receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents,” “creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent,” and “updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents.” The Examiner seeks to cure the deficiencies of Warrier with Haverinen.

Haverinen discloses a method for load balancing in a telecommunications system supporting Mobile IP. A single home agent acts as the primary home agent. Packets destined for a mobile node may be transmitted via one or more secondary home agents. See Abstract.

The registration request that is received by the primary home agent of Haverinen is specifically addressed to the primary home agent. In other words, the registration request is not addressed to a virtual home agent address. Rather, the primary home agent advertises its presence by sending advertisement messages. See

paragraph 0022. The mobile node can also send an agent solicitation in order to find out the possible agents in the network. See paragraph 0023. Once the mobile node obtains the address of the primary home agent, the mobile node sends a registration request including the address of the primary home agent. See paragraph 0026. Accordingly, Appellant respectfully submits that Haverinen fails to disclose or suggest “receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents.”

It is important to note that since the invention of claim 1 enables a mobile node to send a registration request to a virtual home agent address, the mobile node need not send an agent solicitation or obtain the specific address of a primary home agent. Moreover, in the event of failure of the primary home agent, it is possible to replace the primary home agent with another home agent without requiring the mobile node to obtain the identity of the new primary home agent. As a result, the claimed invention enables a registration request to be transmitted with minimal processing on the behalf of the mobile node. In addition, the claimed invention eliminates the risk that the mobile node will send a registration request to a home agent that is no longer acting as the primary home agent.

When a registration request is transmitted, the primary home agent of Haverinen receives the registration request. See paragraph 0027. If the registration request is acceptable, the primary home agent updates the care-of address list it maintains by adding a mobility binding (by associating the care-of address with the home address of the mobile node) and its lifetime. See paragraph 0027. Thus, it is important to note that the primary home agent of Haverinen controls the terms of the registration, such as the registration lifetime.

Once the primary home agent of Haverinen processes the registration request, it sends a routing request (Start Forwarding) to the secondary home agent. See paragraph 0027. The routing request serves as a “start forwarding” message including at least the home address and the care-of address of the mobile node. See paragraph 0027. Upon receiving the routing request, the secondary home agent maintains mobility bindings according to messages received from the primary home agent. For instance, the home addresses and lifetimes of the mobile nodes to be served are stored. See paragraph 0029. When the secondary home agent acknowledges that it can transmit packets, the primary home agent can accept the registration request and update its care-of address list. See paragraph 0030.

The registration request of Haverinen is not forwarded to the secondary home agent. In other words, the secondary home agent does not process the registration request. As a result, a registration reply is not received from the secondary Home Agent. It follows that the care-of address list is not subsequently updated when a registration reply is received from the secondary home agent. Paragraphs 0021-0023 cited by the Examiner say nothing about updating the care-of address list.

Accordingly, Appellant respectfully submits that Haverinen fails to disclose or suggest “updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents.” Accordingly, Appellant respectfully submits that the Examiner has failed to make out a prima facie case of obviousness.

It is important to note that the routing request transmitted by the primary home agent of Haverinen is not equivalent to a registration request. Similarly, the acknowledgement sent by the secondary home agent indicating that it can transmit packets is not equivalent to a registration reply. In fact, it is clear from Haverinen that the acknowledgement sent by the secondary home agent merely acknowledges that the secondary home agent can transmit packets. See paragraph 0030. The acknowledgement does not include a registration lifetime, since the primary home agent has already established the registration lifetime. Accordingly, the primary Home Agent of Haverinen controls the terms of the registration, such as the registration lifetime.

Since the secondary home agent of Haverinen merely acknowledges the routing request to indicate that it can forward packets, the secondary home agent has no control over the terms of the Mobile IP session such as the registration lifetime assigned to the mobile node. Rather, the primary home agent of Haverinen provides this information in the registration reply. See paragraph [0031]. It is important to note that since the secondary Home Agent of Haverinen has been notified that it is to transmit packets and the registration request has been processed by the primary Home Agent, Haverinen suggests that it is unnecessary to forward the registration request to the secondary home agent. Accordingly, Appellant teaches away from sending the registration request to the secondary home agent.

In contrast, with respect to the claimed invention, since a registration reply is received from the secondary home agent, the claimed invention enables the secondary home agent to control terms of the Mobile IP session such as the registration lifetime

of the mobile node. The primary home agent then updates its temporary binding with information received in the registration reply, such as the registration lifetime. This is important, since the secondary home agent -- the home agent that will actually transmit the packets -- establishes the registration lifetime.

The combination of Warriar and Haverinen would result in a system in which the primary Home Agent that merely serves as a cluster controller establishes the terms of the registration, rather than the secondary Home Agent that is actually responsible for transmitting packets. This is disadvantageous, since the secondary Home Agent may be unable to transmit packets during the registration lifetime that has been established by the primary home agent. Alternatively, the primary Home Agent that has established a registration lifetime may have established a lower registration lifetime than that requested by the Mobile Node (e.g., if the requested registration lifetime cannot be supported by the secondary Home Agent), which would require the Mobile Node to submit a subsequent registration request, adding to the inefficiencies of the registration process. Moreover, since a virtual Home Agent address is not used, the Mobile Node must be aware of the primary Home Agent, and any changes in the identity of the primary Home Agent. Accordingly, the combination of Warriar and Haverinen would fail to achieve the desired result, since the registration process would be more burdensome to the Mobile Node. Appellant therefore submits that claims 1 and 44-46 are patentable over the cited references.

Claim 2 recites “wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.” Similarly, claim 50 depends from claim 45, “wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.” Even if it were shown that Haverinen discloses a temporary binding, as claimed, such a temporary binding is not updated by the first one of the plurality of Home Agents to create a permanent binding when a registration reply is received from the second one of the plurality of Home Agents, since as set forth above, the second one of the plurality of Home Agents does not

process the registration request or send a registration reply. Accordingly, Appellant respectfully submits that claims 2 and 50 are patentable over the cited art.

Similarly, claim 3 recites “wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address associated with the second one of the plurality of Home Agents, and a registration lifetime.” In addition, claim 51 depends from claim 45, “wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address associated with the second one of the plurality of Home Agents, and a registration lifetime.”

Even if it were shown that Haverinen discloses the claimed fields, the cited references fail to disclose updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents, where the permanent binding includes the fields recited in claim 3. As set forth above, this is impossible, since a registration reply is not received from the second one of the plurality of Home Agents. Accordingly, Appellant respectfully submits that claims 3 and 51 are allowable.

Claim 4 depends from claim 3, and further recites “wherein the identifier is an IP address.” Similarly, 52 depends from claim 51, “wherein the identifier is an IP address.” Since claim 4 depends from claim 3, and claim 52 depends from claim 51, Appellant respectfully submits that claims 4 and 52 are also allowable.

Claim 5 depends from claim 4, and further recites “wherein the permanent binding further comprises an NAI associated with the Mobile Node.” Since claim 5 depends from claim 4, which depends from claim 3, Appellant respectfully submits that claim 5 is allowable. Similarly, claim 53 depends from claim 52, and further recites “wherein the permanent binding further comprises an NAI associated with the Mobile Node.” Since claim 53 depends from 52, which depends from claim 51, Appellant respectfully submits that claim 53 is allowable.

The invention of claims 6 and 7 enable the secondary home agent to specify a lifetime to be assigned to the mobile node. More particularly, claim 6 depends from claim 3, and further recites, “obtaining the registration lifetime from the registration

reply received from the second one of the plurality of Home Agents.” In other words, the primary home agent obtains the registration lifetime received from the secondary home agent. Similarly, claim 7 depends from claim 1, and further recites “wherein updating the temporary binding to create a permanent binding comprises: specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.” In other words, the registration lifetime obtained from the registration reply received from the secondary home agent may be used to update the temporary binding to a permanent binding.

Similarly, claim 54 depends from claim 51, “at least one of the processor and the memory being further adapted for obtaining the registration lifetime from the registration reply received from the second one of the plurality of Home Agents.” Similarly, claim 55 depends from claim 45, and further recites “wherein updating the temporary binding to create a permanent binding comprises specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.”

As set forth above, Haverinen discloses that if the registration request is acceptable, the primary home agent updates the care-of address list it maintains by adding mobility binding (by associating the care-of address with the home address of the mobile node) and its lifetime. See paragraph 0027. Moreover, the cited references fail to disclose or suggest the second Home Agent processing the registration request and transmitting a registration reply. As such, Haverinen teaches away from obtaining a registration lifetime from a registration reply received from a second Home Agent. Accordingly, Appellant respectfully submits that claims 6-7 and 54-55 are patentable over the cited art.

Claim 8 depends from claim 7 and further recites “wherein updating the temporary binding to create a permanent binding comprises: specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.” Similarly, claim 56 depends from claim 55, “wherein updating the temporary binding to create a permanent binding comprises specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.” As set forth above, the temporary binding of Haverinen is not updated to create a permanent binding when a registration reply is received from the second Home Agent. Moreover, neither of the cited references discloses or suggests specifying an IP

address that has been assigned to a Mobile Node by the second one of the plurality of Home agents. Accordingly, Appellant respectfully submits that claims 8 and 56 are patentable over the cited art.

Claim 9 depends from claim 1, and further recites “obtaining the temporary binding; and identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent.” Claim 57 recites an equivalent apparatus claim. It is important to note that the registration reply is initially received by the primary Home Agent from the second Home Agent. The cited art, separately or in combination, fails to disclose or suggest obtaining the temporary binding and identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent, where the registration reply has been received from the second Home Agent. Accordingly, Appellant respectfully submits that claims 9 and 57 is patentable over the cited art.

Claim 12 and claim 60 further recite “wherein the registration request specifies a destination IP address as the virtual Home Agent address.” Similarly, claim 13 and claim 61 further recite “wherein the registration reply specifies a destination IP address as the virtual Home Agent address.” Similarly, claim 14 and 62 further recite “wherein the registration request specifies a destination IP address as the virtual Home Agent address and the registration reply specifies a destination IP address as the virtual Home Agent address.” While paragraphs [0021]-[0023] disclose the ability to send packets to the mobile node to a visited network, Haverinen says nothing about a virtual network or a virtual Home Agent address. In fact, Haverinen implies that the foreign agents advertise distinct care-of addresses. See paragraph [0022]. Moreover, Haverinen discloses that the Mobile Node can deregister from its primary Home agent (rather than a virtual Home Agent address).

Accordingly, Appellant respectfully submits that claims 12-14 are patentable over the cited references.

Claim 15 and claim 63 further recite “advertising a virtual network associated with the virtual Home Agent address.” The Examiner again cites paragraphs [0021]-[0023] of Haverinen. Although agent advertisements are disclosed, Haverinen fails to disclose or suggest advertising a virtual network associated with a virtual Home Agent address. Accordingly, Appellant respectfully submits that claim 15 is patentable over the cited references.

Claim 16 and claim 64 further recite, “wherein advertising comprises sending a routing table update.” Similarly, paragraphs [0021]-[0023] of Haverinen cited by the Examiner fail to disclose or suggest sending routing table updates for the purpose of advertising a virtual network associated with a virtual Home Agent address. Accordingly, Appellant submits that claim 16 is patentable over the cited references.

Claim 17 and claim 65 further recite “sending at least one of Home Agent health and load information associated with the first one of the plurality of Home Agents to one or more of the plurality of Home Agents.” While the Examiner cites paragraphs [0021]-[0023], Appellant was unable to find a reference to health and load information, or to the sending of such information by the primary Home Agent to one or more “clustered” Home Agents. Accordingly, Appellant submits that claim 17 is patentable over the cited references.

Claim 18 and claim 66 further recites “receiving an advertisement from one of the plurality of Home Agents, the advertisement advertising the virtual network associated with the virtual Home Agent address.” As set forth above with respect to claim 15, the Examiner again cites paragraphs [0021]-[0023] of Haverinen. Although agent advertisements are disclosed, Haverinen fails to disclose or suggest advertising a virtual network associated with a virtual Home Agent address. Accordingly, Appellant respectfully submits that claim 18 is patentable over the cited references.

Claim 19 and claim 67 further recites, “wherein receiving an advertisement from one of the plurality of Home Agents comprises: receiving one or more routing table updates advertising the virtual network associated with the virtual Home Agent address.” As set forth above with reference to claim 16, paragraphs [0021]-[0023] of Haverinen cited by the Examiner fail to disclose or suggest sending or receiving routing table updates for the purpose of advertising a virtual network associated with a virtual Home Agent address. Accordingly, Appellant submits that claim 19 is patentable over the cited references.

Claims 20 and 68 further recite “receiving at least one of Home Agent health and load information associated with the one of the plurality of Home Agents.” Similarly, claims 21 and 69 further recite “receiving at least one of Home Agent health and load information associated with one of the plurality of Home Agents.” As discussed above with respect to claim 17, while the Examiner cites paragraphs [0021]-[0023], Appellant was unable to find a reference to health and load information, or to the receiving of such information by the primary Home Agent from one or more “clustered” Home Agents. Accordingly, Appellant submits that claims 20-21 are patentable over the cited references.

Claim 22 depends from claim 21, and further comprises:

“determining from the Home Agent health information whether the one of the plurality of Home Agents is functioning; and

when the one of the plurality of Home Agents is not functioning, sending a set of Mobile Node bindings to a backup Home Agent associated with the virtual Home

Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent.”

Claim 70 is an apparatus claim of similar scope.

The Examiner cites paragraphs [0021]-[0023], which indicate that the primary home agent can delegate its tasks to one or more secondary home agents. More particularly, the primary home agent can request that a secondary home agent take care of actual packet transmission. However, Haverinen says nothing about the primary Home Agent determining from Home Agent health information whether the one of the plurality of Home Agents (e.g., secondary Home Agent) is functioning. Similarly, Haverinen neither discloses nor suggests sending a set of Mobile Node bindings to a backup Home Agent associated with a virtual Home Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent when the one of the plurality of Home Agents (e.g., secondary Home Agent) is not functioning. Accordingly, Appellant respectfully submits that claims 22 and 70 are patentable over the cited references.

Claims 23 and 71 further recite, “wherein updating one or more bindings such that the one or more bindings are associated with the backup Home Agent comprises associating one or more Mobile Nodes with an IP address of the backup Home Agent.” Claims 23 and 71 are patentable for the reasons set forth above with respect to claim 22. Moreover, Haverinen also fails to disclose associating one or more Mobile Nodes with an IP address of the backup Home Agent. Accordingly, Appellant respectfully submits that claimd 23 and 71 are patentable over the cited references.

Claims 24 and 72 further recite, “selecting the backup Home Agent from a plurality of backup Home Agents.” Claim 24 is patentable for the reasons set forth above with respect to claim 22. Moreover, although the Examiner cites paragraphs [0021]-[0023] of Haverinen, Haverinen fails to disclose or suggest selecting a backup Home Agent from a plurality of backup Home Agents when it is determined that another Home Agent is not functioning. Accordingly, Appellant respectfully submits that claim 24 is patentable over the cited references.

Claims 25 and 73, further recite “examining load information of the plurality of backup Home Agents prior to selecting the backup Home Agent.” Claim 25 is patentable for the reasons set forth above with respect to claim 24. Similarly, claim 73 is patentable for the reasons set forth above with respect to claim 72. Moreover, although the Examiner cites paragraphs [0021]-[0023] of Haverinen fails to disclose or suggest examining load information of the plurality of backup Home Agents prior to selecting the backup Home Agent. In fact, Haverinen says nothing about examining load information. Accordingly, Appellant respectfully submits that claim 25 is patentable over the cited references.

Claims 26 and 74 further recite, “sending one or more bindings to one or more backup Home Agents, the one or more bindings being associated with one or more of the plurality of Home Agents.” In other words, the primary Home Agent (i.e., Home Agent Cluster Controller) can send bindings associated with Home Agents in the Home Agent cluster to one or more backup Home Agents, enabling one of the backup Home Agents to take over for the Home Agent Cluster Controller or (another of the

plurality of Home Agents in the cluster) in the event of its failure. Although the Examiner cited paragraphs [0021]-[0023] of Haverinen, Appellant was unable to find a reference to the sending of bindings. Accordingly, Appellant respectfully submits that claims 26 and 74 are patentable over the cited art.

Claims 27 and 75 further recite, wherein sending one or more bindings comprises “sending one or more temporary bindings and one or more permanent bindings to the one or more backup Home Agents.” Claim 27 depends from claim 26, and is patentable for at least the same reasons. Similarly, claim 75 depends from claim 74, and is patentable for at least the same reasons. Moreover, paragraphs [0021]-[0023] fail to disclose or suggest sending one or more temporary bindings and one or more permanent bindings to one or more backup Home Agents. Accordingly, Appellant submits that claims 27 and 75 are patentable over the cited art.

Claim 28, which depends from claim 1, and claim 76, which depends from claim 45, recite:

“when the registration request is received, searching for a binding for the Mobile Node;

when a binding for the Mobile Node exists, identifying the second one of the plurality of Home Agents in the binding prior to sending the registration request to the second one of the plurality of Home Agents; and

when a binding for the Mobile Node does not exist, selecting the second one of the plurality of Home Agents prior to sending the registration request to the second one of the plurality of Home Agents.”

As set forth above, Haverinen does not send the registration request to the second Home Agent, as required by claims 28 and 76. Rather, Haverinen merely discloses sending a routing request that merely delegates the transmission of packets destined for the mobile node to the secondary Home Agent. While Haverinen suggests that the secondary Home Agent can send an acknowledgement (see paragraph [0030]), the secondary Home Agent may not transmit a registration reply or control the parameters of the registration. In other words, the routing request is not equivalent to a registration request. As such, the combination of the cited art fails to operate as claimed. Accordingly, Appellant respectfully submits that claims 28 and 76 are patentable over the cited art.

7.2. Ground II

7.2.1. Claims 10-11

With respect to claims 10-11, the Examiner has rejected claims 10-11 over Warrier and Haverinen, and further in view of Johansson, U.S. Patent Application Publication No. 2002/0080752, ('Johansson' hereinafter).

Claim 10 and claim 58 further recite “wherein the registration request specifies a destination MAC address equal to a MAC address assigned to the second one of the plurality of Home Agents.” In other words, the registration request is sent to the second Home Agent. In contrast, as set forth above, Haverinen sends only a routing request to the second Home Agent, rather than a registration request. As a result, the prior art does not enable the second “clustered” Home Agent to control the terms of the Mobile Node’s registration, such as the registration lifetime, by sending a registration reply. In fact, Haverinen teaches away from sending the registration

request to the second Home Agent. Accordingly, Appellant submits that claims 10 and 58 are patentable over the cited art.

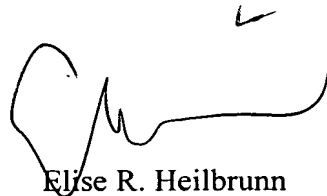
Claim 11 and claim 59 further recite “wherein the registration reply specifies a destination MAC address equal to a MAC address assigned to the first one of the plurality of Home Agents.” In other words, the registration reply that is transmitted by the second “clustered” Home Agent is sent to the first, primary Home Agent. As set forth above, Haverinen teaches away from sending a registration reply from a second “clustered” Home Agent to the first, primary Home Agent. In fact, since Haverinen does not send a registration request to the second Home Agent, the second Home Agent does not send a registration reply to the first Home Agent. Accordingly, Appellant submits that claim 11 is patentable over the cited art.

Johansson fails to cure the deficiencies of Warrier and Haverinen. While Johansson does disclose the use of a virtual home agent, the home agents are connected solely for redundancy purposes. Thus, data is transmitted by a primary to a backup home agent via the virtual router redundancy protocol (VRRP). In other words, the backup home agent is updated with registrations received by the primary home agent via the VRRP. See paragraph 0142. It would therefore be unnecessary for a Home Agent that is not processing registration requests to intercept registration requests, or transmit the registration requests to another Home Agent. As such, Johansson teaches away from intercepting registration requests by a Home Agent that will not be servicing the request.

In addition, paragraph 0086 of Johansson cited by the Examiner fails to disclose or suggest specifying a destination MAC address equal to a MAC address assigned to either the second or first Home Agent in the registration request, as recited in claims 10-11, respectively. Rather, paragraph 0086 of Johansson merely discusses forwarding traffic destined for a mobile node based upon the IP address and MAC address of the mobile node. As such, the combination of the cited references would fail to achieve the desired result. Accordingly, Appellant respectfully submits that claims 10-11 are patentable over the cited references.

8. CONCLUSION

In view of the foregoing, it is respectfully submitted that the Examiner's rejection of claims 1-9, 12-28 and 44-76 as being unpatentable over Warriar in view of Haverinen is erroneous. In addition, it is respectfully submitted that the Examiner's rejection of claims 10-11 as being unpatentable over Warriar and Haverinen, and further in view of Johansson is erroneous. Accordingly, the rejection of claims 1-28 and 44-76 under 35 U.S.C. §103 should be reversed.

A handwritten signature in black ink, appearing to read 'Elise R. Heilbrunn', with a small checkmark above it.

Elise R. Heilbrunn
Registration No. 42,649

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9. CLAIMS APPENDIX
[37 CFR 41.37(c)(1)(viii)]

CLAIMS ON APPEAL

1. (Previously Presented) In a first one of a plurality of Home Agents supporting Mobile IP, a method of processing a registration request from a Mobile Node that has roamed to a Foreign Agent supporting Mobile IP, comprising:

receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents;

sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent;

creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent;

receiving a registration reply from the second one of the plurality of Home Agents;

updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents; and

sending the registration reply to the Foreign Agent identified in the temporary binding.

2. (Original) The method as recited in claim 1, wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address

associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.

3. (Original) The method as recited in claim 1, wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address associated with the second one of the plurality of Home Agents, and a registration lifetime.
4. (Original) The method as recited in claim 3, wherein the identifier is an IP address.
5. (Original) The method as recited in claim 4, wherein the permanent binding further comprises an NAI associated with the Mobile Node.
6. (Original) The method as recited in claim 3, further comprising:
obtaining the registration lifetime from the registration reply received from the second one of the plurality of Home Agents.
7. (Original) The method as recited in claim 1, wherein updating the temporary binding to create a permanent binding comprises:
specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.

8. (Original) The method as recited in claim 7, wherein updating the temporary binding to create a permanent binding comprises:
- specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.
9. (Original) The method as recited in claim 1, further comprising:
- obtaining the temporary binding; and
- identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent.
10. (Original) The method as recited in claim 1, wherein the registration request specifies a destination MAC address equal to a MAC address assigned to the second one of the plurality of Home Agents.
11. (Original) The method as recited in claim 1, wherein the registration reply specifies a destination MAC address equal to a MAC address assigned to the first one of the plurality of Home Agents.
12. (Original) The method as recited in claim 1, wherein the registration request specifies a destination IP address as the virtual Home Agent address.
13. (Original) The method as recited in claim 1, wherein the registration reply specifies a destination IP address as the virtual Home Agent address.

14. (Original) The method as recited in claim 1, wherein the registration request specifies a destination IP address as the virtual Home Agent address and the registration reply specifies a destination IP address as the virtual Home Agent address.
15. (Original) The method as recited in claim 1, further comprising:
advertising a virtual network associated with the virtual Home Agent address.
16. (Original) The method as recited in claim 15, wherein advertising comprises sending a routing table update.
17. (Original) The method as recited in claim 1, further comprising:
sending at least one of Home Agent health and load information associated with the first one of the plurality of Home Agents to one or more of the plurality of Home Agents.
18. (Original) The method as recited in claim 15, further comprising:
receiving an advertisement from one of the plurality of Home Agents, the advertisement advertising the virtual network associated with the virtual Home Agent address.
19. (Original) The method as recited in claim 18, wherein receiving an advertisement from one of the plurality of Home Agents comprises:

receiving one or more routing table updates advertising the virtual network associated with the virtual Home Agent address.

20. (Original) The method as recited in claim 18, further comprising:
receiving at least one of Home Agent health and load information associated with the one of the plurality of Home Agents.

21. (Original) The method as recited in claim 1, further comprising:
receiving at least one of Home Agent health and load information associated with one of the plurality of Home Agents.

22. (Original) The method as recited in claim 21, further comprising:
determining from the Home Agent health information whether the one of the plurality of Home Agents is functioning; and
when the one of the plurality of Home Agents is not functioning, sending a set of Mobile Node bindings to a backup Home Agent associated with the virtual Home Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent.

23. (Original) The method as recited in claim 22, wherein updating one or more bindings such that the one or more bindings are associated with the backup Home Agent comprises:

associating one or more Mobile Nodes with an IP address of the backup Home Agent.

24. (Original) The method as recited in claim 22, further comprising:
selecting the backup Home Agent from a plurality of backup Home Agents.
25. (Original) The method as recited in claim 24, further comprising:
examining load information of the plurality of backup Home Agents prior to
selecting the backup Home Agent.
26. (Original) The method as recited in claim 1, further comprising:
sending one or more bindings to one or more backup Home Agents, the one or
more bindings being associated with one or more of the plurality of Home Agents.
27. (Original) The method as recited in claim 26, wherein sending one or
more bindings comprises:
sending one or more temporary bindings and one or more permanent bindings
to the one or more backup Home Agents.
28. (Original) The method as recited in claim 1, further comprising:
when the registration request is received, searching for a binding for the
Mobile Node;

when a binding for the Mobile Node exists, identifying the second one of the plurality of Home Agents in the binding prior to sending the registration request to the second one of the plurality of Home Agents; and

when a binding for the Mobile Node does not exist, selecting the second one of the plurality of Home Agents prior to sending the registration request to the second one of the plurality of Home Agents.

- 29. (Cancelled)
- 30. (Cancelled)
- 31. (Cancelled)
- 32. (Cancelled)
- 33. (Cancelled)
- 34. (Cancelled)
- 35. (Cancelled)
- 36. (Cancelled)
- 37. (Cancelled)
- 38. (Cancelled)
- 39. (Cancelled)
- 40. (Cancelled)
- 41. (Cancelled)
- 42. (Cancelled)
- 43. (Cancelled)

44. (Previously Presented) A first one of a plurality of Home Agents supporting Mobile IP, the first one of the plurality of Home Agents being adapted for processing a registration request from a Mobile Node that has roamed to a Foreign Agent supporting Mobile IP, comprising:

means for receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents;

means for sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent;

means for creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent;

means for receiving a registration reply from the second one of the plurality of Home Agents;

means for updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents; and

means for sending the registration reply to the Foreign Agent identified in the temporary binding.

45. (Previously Presented) A first one of a plurality of Home Agents supporting Mobile IP, the first one of the plurality of Home Agents being adapted for processing a registration request from a Mobile Node that has roamed to a Foreign Agent supporting Mobile IP, comprising:

a processor; and

a memory, at least one of the processor and the memory being adapted for:

receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents;

sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent;

creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent;

receiving a registration reply from the second one of the plurality of Home Agents;

updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents; and

sending the registration reply to the Foreign Agent identified in the temporary binding.

46. (Previously Presented) A computer-readable medium storing thereon computer-readable instructions for processing a registration request from a Mobile Node that has roamed to a Foreign Agent supporting Mobile IP in a first one of a plurality of Home Agents supporting Mobile IP, comprising:

instructions for receiving a registration request addressed to a virtual Home Agent address associated with the plurality of Home Agents;

instructions for sending the registration request to a second one of the plurality of Home Agents such that the second one of the plurality of Home Agents creates a binding between the Mobile Node and the Foreign Agent;

instructions for creating a temporary binding by the first one of the plurality of Home Agents between the Mobile Node and the Foreign Agent;

instructions for receiving a registration reply from the second one of the plurality of Home Agents;

instructions for updating the temporary binding by the first one of the plurality of Home Agents to create a permanent binding when the registration reply is received from the second one of the plurality of Home Agents; and

instructions for sending the registration reply to the Foreign Agent identified in the temporary binding.

47. (Cancelled)

48. (Cancelled)

49. (Cancelled)

50. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the temporary binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, and an IP address associated with the second one of the plurality of Home Agents.

51. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the permanent binding comprises an identifier associated with the Mobile Node, an IP address associated with the Foreign Agent, an IP address

associated with the second one of the plurality of Home Agents, and a registration lifetime.

52. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 51, wherein the identifier is an IP address.

53. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 52, wherein the permanent binding further comprises an NAI associated with the Mobile Node.

54. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 51, at least one of the processor and the memory being further adapted for:

obtaining the registration lifetime from the registration reply received from the second one of the plurality of Home Agents.

55. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein updating the temporary binding to create a permanent binding comprises:

specifying a granted registration lifetime obtained from the registration reply received from the second one of the plurality of Home Agents.

56. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 55, wherein updating the temporary binding to create a permanent binding comprises:

specifying an IP address assigned to the Mobile Node by the second one of the plurality of Home Agents.

57. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

obtaining the temporary binding; and

identifying the Foreign Agent from the temporary binding prior to sending the registration reply to the Foreign Agent.

58. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the registration request specifies a destination MAC address equal to a MAC address assigned to the second one of the plurality of Home Agents.

59. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the registration reply specifies a destination MAC address equal to a MAC address assigned to the first one of the plurality of Home Agents.

60. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the registration request specifies a destination IP address as the virtual Home Agent address.

61. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the registration reply specifies a destination IP address as the virtual Home Agent address.

62. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, wherein the registration request specifies a destination IP address as the virtual Home Agent address and the registration reply specifies a destination IP address as the virtual Home Agent address.

63. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

advertising a virtual network associated with the virtual Home Agent address.

64. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 63, wherein advertising comprises sending a routing table update.

65. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

sending at least one of Home Agent health and load information associated with the first one of the plurality of Home Agents to one or more of the plurality of Home Agents.

66. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 63, at least one of the processor and the memory being further adapted for:

receiving an advertisement from one of the plurality of Home Agents, the advertisement advertising the virtual network associated with the virtual Home Agent address.

67. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 66, wherein receiving an advertisement from one of the plurality of Home Agents comprises:

receiving one or more routing table updates advertising the virtual network associated with the virtual Home Agent address.

68. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 66, at least one of the processor and the memory being further adapted for:

receiving at least one of Home Agent health and load information associated with the one of the plurality of Home Agents.

69. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

receiving at least one of Home Agent health and load information associated with one of the plurality of Home Agents.

70. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 69, at least one of the processor and the memory being further adapted for:

determining from the Home Agent health information whether the one of the plurality of Home Agents is functioning; and

when the one of the plurality of Home Agents is not functioning, sending a set of Mobile Node bindings to a backup Home Agent associated with the virtual Home Agent address and updating one or more bindings such that the one or more bindings are associated with the backup Home Agent.

71. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 70, wherein updating one or more bindings such that the one or more bindings are associated with the backup Home Agent comprises:

associating one or more Mobile Nodes with an IP address of the backup Home Agent.

72. (Previously Presented) The first one of a plurality of Home Agent as recited in claim 70, at least one of the processor and the memory being further adapted for:

selecting the backup Home Agent from a plurality of backup Home Agents.

73. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 72, at least one of the processor and the memory being further adapted for:

examining load information of the plurality of backup Home Agents prior to selecting the backup Home Agent.

74. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

sending one or more bindings to one or more backup Home Agents, the one or more bindings being associated with one or more of the plurality of Home Agents.

75. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 74, wherein sending one or more bindings comprises:

sending one or more temporary bindings and one or more permanent bindings to the one or more backup Home Agents.

76. (Previously Presented) The first one of a plurality of Home Agents as recited in claim 45, at least one of the processor and the memory being further adapted for:

when the registration request is received, searching for a binding for the Mobile Node;

when a binding for the Mobile Node exists, identifying the second one of the plurality of Home Agents in the binding prior to sending the registration request to the second one of the plurality of Home Agents; and

when a binding for the Mobile Node does not exist, selecting the second one of the plurality of Home Agents prior to sending the registration request to the second one of the plurality of Home Agents.

EVIDENCE appendix

[37 CFR 41.37(c)(1)(ix)]

No evidence has been submitted pursuant to §§ 1.130, 1.131, or 1.132 of 37 CFR, nor has any other evidence been entered by the examiner.

10. RELATED PROCEEDINGS APPENDIX

[37 CFR 41.37(c)(1)(x)]

There have been no decisions rendered by a court or the Board in any proceeding identified pursuant to paragraph (c)(1)(ii) of 37 CFR 41.37(c)(1).